

Rejections Under 35 U.S.C. § 103

The Examiner rejected claims 1-7 under 35 U.S.C. § 103(a) as being unpatentable over Sundar et al. (U.S. Pat. No. 6,283,701) in view of Matsukawa et al. (U.S. Pat. No. 5,518,542). Specifically, the Examiner stated:

Regarding claim 1, Sundar et al. disclose (fig 5) a holding structure (90) having members (93) arranged to hold and rotate (by roller 92, column 3 line 55-65) the substrate (302) about a first axis, the holding structure (90) being coupled to a rotatable member (piston rod, column 3 line 55-65).

However, Sundar et al. is silent on the rotatable member configured to rotate the holding structure about a second axis different from the first axis.

On the other hand, Matsukawa et al. teach on the rotatable member configured to rotate the holding structure (111a, 111b) about a second axis (flipping) different from the first axis (rotate by the roller 92) for the purpose of providing the ability for testing system to test the wafer from different angle.

It would have been obvious to one having an ordinary skill in the art at the time of the invention was made to modify the robots arm of Sundar et al. and providing the flipping feature as taught by Matsukawa et al. for the purpose of providing the ability for testing system to test the wafer from different angle.

Regarding claim 2, Sundar et al. discloses (fig 5) the members (93) comprises a plurality of wedge assemblies (92) configured to rotate the substrate (302) about the first axis.

Regarding claim 3, Sundar et al. discloses (fig 5) the first axis is disposed generally perpendicular to a flat surface of the substrate (302) and extends generally through an axial center of the substrate.

Regarding claims 4, Matsukawa et al. discloses (fig 12) the holding structure comprises two L shaped gripping arms (111a, 111b) arranged to form a single U shape and configured to hold the substrate substantially parallel to the gripping arms.

Regarding claims 5, 6, Matsukawa et al. discloses the U shaped structure is configured to open and close about the perimeter of the substrate (W).

Regarding claim 7, Sundar et al. discloses (fig 17) the holding structure (90) comprises three wedge assemblies (92, as seen in fig 17), at least one wedge assembly coupled to a motor (column 3 line 55-65)

and configured to rotate the substrate (302) about the first axis disposed generally perpendicular to a flat surface of the substrate (302) and extending generally through an axial center of the substrate.

Applicants respectfully traverse this rejection. The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985).

As a preliminary matter, Applicants have made the following assumption based on perceived errors in the Examiner's rejection. For the purposes of this response, Applicants have assumed that the Examiner's reference to Fig. 12 (Matsukawa et al.) is actually directed to Fig. 7, object 12. If this assumption is incorrect, Applicants respectfully request that the Examiner clarify his rejection such that Applicants may file a more appropriate response.

The present application is directed to an apparatus for inspecting semiconductor wafers. Specifically, in the illustrated embodiment, a holding structure configured to hold a wafer is mounted on a rotational arm to provide a user with a means of inspecting a wafer in any position without having to physically touch the wafer. The holding structure provides a mechanism for holding the wafer and rotating the wafer about an axis that is perpendicular

to the surface of the wafer and that extends through the axial center of the wafer. The arm also provides a mechanism for rotating the wafer about an axis parallel to the surface of the wafer. The arm and holding structure are configured to facilitate the visual inspection of the wafer. Accordingly, claim 1 recites an apparatus for inspecting wafers comprising, "a holding structure having members arranged to hold and rotate the substrate about a first axis, the holding structure being coupled to a rotatable member, the rotatable member configured to rotate the holding structure about a second axis different from the first axis."

Conversely, the Sundar et al. reference relates to a clamping mechanism that secures a wafer to a mechanical arm. Col. 1, lines 12-16. As explicitly stated, the Sundar et al. reference is directed to "a robot that can transfer wafers at increased speeds and acceleration/decelerations." Col. 3, lines 12-14. More particularly, the reference is directed to "a wafer clamping mechanism on a robot that can secure a wafer or a pair of wafers on a wafer blade or a pair of wafer blades with sufficient force to prevent wafer slippage and wafer damage during rapid rotation and radial movement while minimizing or eliminating undesirable particle generation." Col. 3, lines 14-20.

With regard to claim 1, the Examiner stated that Sundar et al. discloses a holding structure (90) having members (93) arranged to hold and rotate (by roller 92) a substrate (302) about a first axis. Applicants respectfully traverse this assertion. The Sundar et al. reference discloses clamp fingers (90) that may include rollers (92) which contact the wafer to "minimize the friction between the clamp fingers (90) and the wafer (302), thereby minimizing the particle generation." Col. 7, lines 60-65. Contrary to the Examiner's assertion, the Sundar et al. reference does not disclose a "member arranged to hold *and rotate*" a wafer. Neither of the roller (92) nor the members (93) are arranged to rotate the

wafer (302). In fact, the Sundar et al. reference fails to disclose any element arranged to rotate the wafer (302) within the holding structure. Conversely, it does not appear that rotation of the wafer is even desirable in the structure disclosed in Sundar et al. since the preferred embodiment discloses clamp fingers (90) including rollers (92) *to minimize the friction between the clamp fingers (90) and the wafer (302)* that might otherwise be caused by movement of the wafer (310) within the clamp fingers (90). Thus, it is clear that Sundar et al. does not disclose a holding structure having members arranged to rotate a wafer.

The Examiner cited the Matsukawa et al. reference as providing a rotatable member configured to rotate the holding structure about a second axis. The Matsukawa et al. reference discloses a holding structure (111a, 111b) coupled to a rotatable member (102). While the holding structure (111a, 111b) is coupled to a rotatable member (102) that facilitates rotation of the wafer about the rotatable member, Matsukawa et al. does not disclose any mechanism for rotating the wafer about a second axis different from the first axis. To accomplish a rotation of the wafer about a second axis, such as one perpendicular to the wafer, the holding structure (111a, 111b) must deposit the wafer onto the wafer support base 130 to allow the spin chuck 120 to rotate the wafer after the holding structure (111a, 111b) has released the wafer. Thus, since the Matsukawa et al. reference does not disclose a holding structure arranged to hold and rotate the wafer about a first axis, and configured to rotate the wafer about a second axis, it is clear that the Matsukawa et al. reference does not disclose all of the elements of the recited claims. Further, since the Matsukawa et al. reference fails to cure the deficiencies of the Sundar et al. reference (i.e. since Sundar et al. reference does not disclose a holding structure having members arranged to hold and rotate the wafer), it is clear that neither reference alone or in

combination provides a *prima facie* case of obviousness since the cited combination fails to disclose all of the elements recited in claim 1. Accordingly, Applicants respectfully submit that claim 1 is allowable over the cited references.

Further, there is no suggestion to modify the Sundar et al. reference in the manner claimed. As previously discussed, the Sundar et al. reference discloses a robotic arm to facilitate the rapid transfer of wafers. The arm includes a clamping mechanism to physically secure the wafer within the structure to prevent slippage or movement of the wafer within the structure. There can be no suggestion to modify the structure disclosed in the Sundar et al. reference to add rotational movement of the wafer within the holding structure since that would clearly destroy the purpose of the Sundar et al. clamping mechanism.

With regard to claim 2, the Examiner stated that Sundar et al. discloses members (93) comprising a plurality of rollers (92) configured to rotate the substrate (302) about the first axis. However, as previously discussed with regard to claim 1, the rollers (92) disclosed by Sundar et al. are not configured to rotate the substrate (302). Sundar et al. does not disclose any structure configured to rotate the substrate, much less provide wedge assemblies configured as such.

With regard to claim 3, the Examiner stated that Sundar et al. discloses the first axis is disposed generally perpendicular to a flat surface of the substrate (302) and extends generally through an axial center of the substrate. Applicants have been unable to identify any mention or illustration of an axis of rotation that extends through an axial center of the substrate in the cited reference. Therefore, Applicants respectfully submit that the subject matter of claim 2 is allowable over the combined references. If the Examiner chooses to

maintain this rejection, Applicant requests that the Examiner specifically identify the location of such information.

Regarding claims 5 and 6, the Examiner stated that Matsukawa et al. discloses the U shaped structure is configured to open and close about the perimeter of the substrate. However, Applicants respectfully submit that the Matsukawa et al. reference fails to disclose the "tensioning springs" recited in claim 6. Therefore, Applicants respectfully submit that the subject matter of claim 6 alone is patentable over the combined references, since the cited references do not disclose or suggest all of the elements recited in claim 6. If the Examiner chooses to maintain this rejection, Applicants request that the Examiner specifically identify the location of such information. In addition, both claims 5 and 6 are believed to be allowable over the cited references because of their dependency on allowable claim 1.

Regarding claim 7, the Examiner stated that Sundar et al. discloses the holding structure comprising three wedge assemblies, at least one wedge assembly coupled to a motor and configured to rotate the substrate about the first axis disposed generally perpendicular to a flat surface of the substrate and extending generally through an axial center of the substrate. As previously discussed with reference to base claim 1, Sundar et al. does not discuss an apparatus configured to rotate the substrate. In fact, the Sundar et al. reference is directed at minimizing friction between the clamp fingers (90) and the wafer (302) to eliminate particle generation and damage to the substrate. Col. 7, line 60 – col. 8, line 5. Furthermore, Sundar et al. does not disclose a wedge assembly, much less three wedge assemblies, wherein one of the wedge assemblies is coupled to a motor. Therefore, Applicants respectfully submit that the subject matter of claim 7 alone is patentable over the

combined references, since the cited references do not disclose or suggest all of the elements in the present claim and further based on the present claim's dependency on allowable claim 2 (and ultimately claim 1). If the Examiner chooses to maintain this rejection, Applicants request that the Examiner specifically identify the location of such information.

Because the cited references do not disclose all of the elements recited in claim 1, much less provide a suggestion to combine the references in the manner recited, they cannot possibly render the claimed subject matter obvious. Further, claims 2-7 are allowable for their subject matter separately recited, as well as based on their dependency on claim 1. Accordingly, Applicants respectfully request withdrawal of the Examiner's rejection and allowance of claims 1-7.

Conclusion


In view of the remarks set forth above, Applicants respectfully request allowance of claims 1-7. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

General Authorization for Extensions of Time

In accordance with 37 C.F.R. § 1.136, Applicants hereby provide a general authorization to treat this and any future reply requiring an extension of time as incorporating a request therefor. Furthermore, Applicants authorize the Commissioner to charge the appropriate fee for any extension of time to Deposit Account No. 13-3092; Order No. MICS:0053/FLE (99-0326).

Respectfully submitted,

Date: August 30, 2002


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